

Environment Studies

(For All Faculties - Second Year Semester III and IV)

◆ Dr. Devidas N. Patil

◆ Dr. Babu K. Avchar

◆ Dr. Deelip G. Shimpi

◆ Dr. B. S. Gaikwad

◆ Dr. Vilas A. Patil

Choice Based Credit System (CBCS)

As Per
New
Syllabus
2020



SUCCESS PUBLICATIONS

This Text Book is useful for Savitribai Phule Pune University and other Universities as well as Competitive Exams.

Environment Studies

For All Faculties - Second Year Semester III and IV

Dr. Devidas N. Patil
(M.Sc., M.Ed., Ph.D.)

Bhartiya Jain Sanghatans, Arts, Science and Commerce College, Wagholi, Pune.

Dr. Bapu. K. Avchar
(M.Sc. Ph.D., LL.B.)

Vidya Pratishthan's Arts, Science & Commerce College, Vidyanagari, Baramati, Pune

Dr. Deelip G. Shimpi
(M.Sc., Ph.D.)

RNC Arts, JDB Commerce NSC Science College, Nashik.

Dr. B. S. Gaikwad
(M.Sc., Ph.D.)

K. J. Somaiya College, Kopergaon, Ahmednagar.

Dr. Vilas A. Patil
(M.Sc., Ph.D.)

Dr. B.N. Purandare Arts, Smt. S. G. Gupta Commerce & Smt. S.A. Mithaiwala Science College, Lonavala.

2020

Price : 250/-



SUCCESS PUBLICATIONS



Dr. D. N. Patil
 (M.Sc., M.Ed., Ph.D.)
 Bhartiya Jain Sanghatans, Arts, Science and Commerce College, Wagholi, Pune.

Dr. D. N. Patil did his M.Sc. (Botany), M.Ed. and Ph.D. from Savitribai Phule Pune University, Pune. He completed his Ph.D. work on Ecotone Studies on Navegaon National Park and Nagaria Wildlife Sanctuary, from Botanical Survey of India as research Centre. He is currently working as Assistant Professor, Head of Botany Department and Coordinator for Environment Awareness Course at Bhartiya Jain Sanghatans, Arts, Science and Commerce College, Pune-Nagar Road, Wagholi, Pune (M.S.). He has 23 years of teaching and research experience. He has published many research papers in National and International reputed journal.



Dr. Bapu K. Avchar
 M.Sc., Ph.D. and LL. B.
 Vidya Pratishthan's Arts, Science and Commerce College, Vidyannagar, Baramati.

Dr. B.K. Avchar is currently working as Associate Professor of Botany at Vidya Pratishthan's Arts, Science and Commerce College, Vidyannagar, Baramati, Dist-Pune (M.S.). He has 26 years of teaching and research experience at Under Graduate and Post Graduate levels. He is a Recognized Guide for Ph.D. students at Savitribai Phule Pune University, Pune. He has published many research papers in International reputed journals. He holds important academic positions like Principal, Vidya Pratishthan's Commerce and Science College, Indapur, Dist-Pune and Member, Board of Studies in Botany, Savitribai Phule Pune University, Pune. He has attended and participated various National and International Seminars and Conferences. He has authored two reference books entitled "Weed Allelopathy" published by Lambert Academic Publishing, Germany and "Plant Diversity and Ecology" published by Success Publication, Pune. He is author of more than 15 text books for B.Sc. Botany students of SPPU, Pune.



Prof. Dr. Deelip G. Shimpi
 M.Sc., Ph.D.
 RNC Arts, JDB Commerce NSC Science College, Nashik.

Prof. Dr. Deelip G. Shimpi is currently working as HOD and Associate Professor, Department of Botany at Gokhale Education Society's RNC Arts, JDB Commerce and NSC Science College, Nashik. He has almost 26 years of teaching experience. He has vast experience in the field of Research. He has published several Research papers in National and International Journals and also attended various National Conferences, Symposium and Workshops. He has been participated in Syllabus framing of Botany syllabus of S.P.P.U., Pune. He worked as a Co-ordinator and subject expert for Tree Census programme of Nashik Municipal Corporation from 2003-2008. He is working as a Chief Examination Superintendent for Indian Institute of Industrial Engineering, CID Belapur, Navi Mumbai and as a College Examination Officer for S.P.P.U., Examination.



Prof. Dr. Balasaheb S. Gaikwad
 M.Sc., Ph.D.
 K. J. Somaiya College, Kopergaon, Ahmednagar.

Prof. Dr. Balasaheb S. Gaikwad is working as HOD and Assistant Professor in Department of Botany in K. J. Somaiya College, Kopergaon, Ahmednagar. He received his M.Sc. in Palaeobotany and Ph.D. in Mutation Breeding from S.P.P.U., Pune. He has 20 years of teaching experience in Botany. He has published 6 Research Papers in leading National and International Journals. He attended and presented his Research Papers in several Conferences and Seminars. He has keen interest in Taxonomy and Mutation breeding. He has published several scientific articles in leading Marathi magazine. He worked as student welfare officer of Board of student welfare and working as assistant programme officer of National service Scheme.



Dr. Vilas A. Patil
 M.Sc., Ph.D.
 Dr. B. N. Purandare Arts, Smt. S. G. Gupta Commerce & Smt. S.A. Mithaiwala Science College, Lonavala.

Dr. Vilas A. Patil working as Vice Principal and Head, Department of Botany, at Dr. B.N. Purandare Arts, Smt. S. G. Gupta Commerce & Smt. S.A. Mithaiwala Science College, Lonavala. He has 25 years of teaching experience at PG and UG level. He has completed two minor research project funded by UGC New Delhi and ICDD Savitribai Phule Pune University Pune. Recognized guide for Ph. D. of Savitribai Phule Pune University, Pune. Three students registered for Ph. D. Degree. Fifteen research papers published in National and International Journal, Attended many National Seminars and Conference and presented Papers in the National and International Seminars and Conferences.

ISBN : 978-93-24457-36-4



SUCCESS PUBLICATIONS

Address : Radha Krishna Apartment, 535, Shanwar Peth,
 Appa Balwant Chowk, Opp. Prabhat Theatre, Pune - 30.
 Ph. No. 24434662, Mobile : 9325315464
 E-mail : sharpgroup31@rediffmail.com
 Website : www.sharpmultinational.com

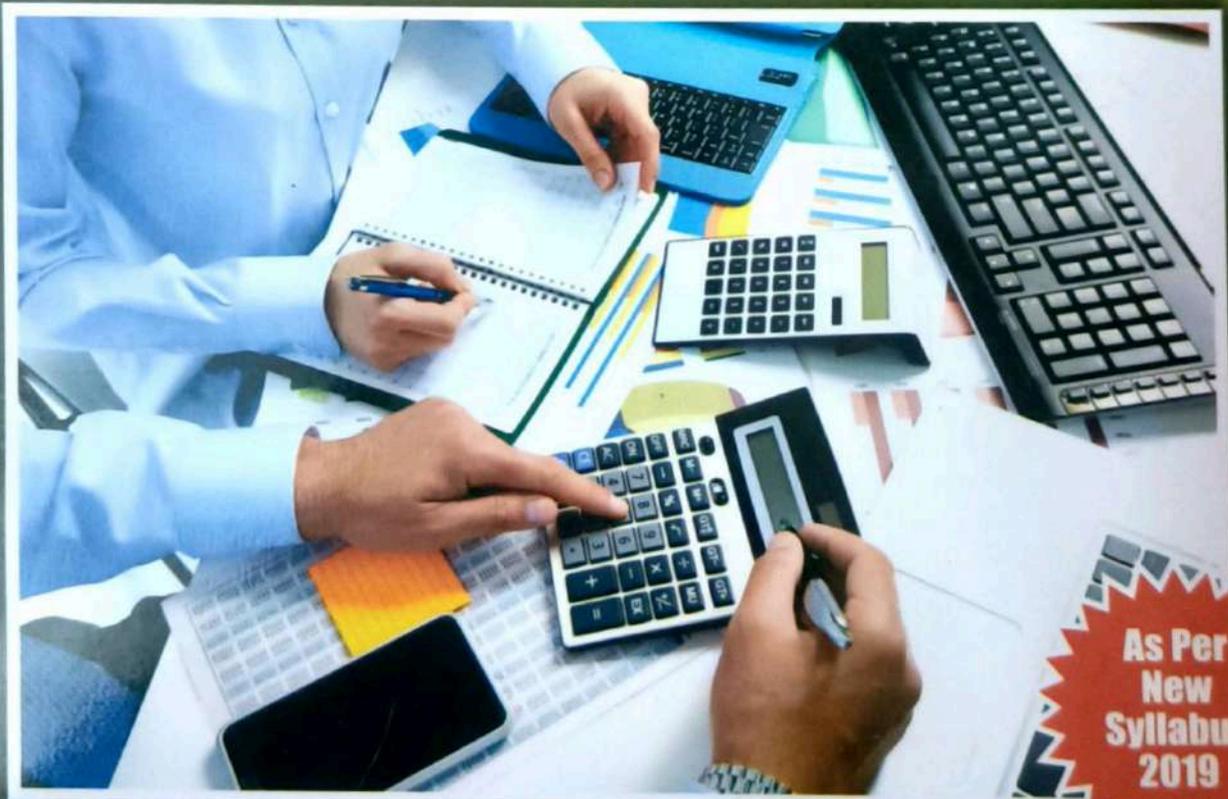
PT-
 3358

BUSINESS ACCOUNTING

B.B.A.\B.B.A. (IB) (Sem. - I)

- Dr. Yashodhan Mithare
- Dr. Govind M. Dumbre
- Dr. Arun Gaikwad
- **Mr. Akash A. Thakur**
- Mr. Sagar Gunjal

Choice Based Credit System (CBCS)



As Per
New
Syllabus
2019



SUCCESS PUBLICATIONS

BUSINESS COMMUNICATION SKILLS
 B.B.A./B.B.A. (CA)/B.B.A.(IB) (Sem. - I)
 • Dr. Govind M. Dumbley • Dr. Satish Bhosale
 • Mr. Khalid Arshad
 Choice Based Credit System (CBCS)
 As Per New Syllabus 2019

SUCCESS PUBLICATIONS

PRINCIPLES OF MANAGEMENT
 B.B.A./B.B.A. (CA)/B.B.A.(IB) (Sem. - I)
 • Dr. Babasaheb Sangale • Dr. Prasanna Deshmukh
 • Mr. Khalid Arshad
 Choice Based Credit System (CBCS)
 As Per New Syllabus 2019

SUCCESS PUBLICATIONS

BUSINESS MATHEMATICS
 B.B.A./B.B.A. (CA)/B.B.A.(IB) (Sem. - I)
 Choice Based Credit System (CBCS)
 As Per New Syllabus 2019

SUCCESS PUBLICATIONS

BUSINESS DEMOGRAPHY
 B.B.A./B.B.A.(IB) (Sem. - I)
 • Dr. Sudhakar Jalhewar • Dr. Sandesh Shingave
 Choice Based Credit System (CBCS)
 As Per New Syllabus 2019

SUCCESS PUBLICATIONS

BUSINESS ACCOUNTING
 B.B.A./B.B.A. (CA)/B.B.A.(IB) (Sem. - I)
 Choice Based Credit System (CBCS)
 As Per New Syllabus 2019

SUCCESS PUBLICATIONS

BUSINESS ECONOMICS (MICRO)
 B.B.A./B.B.A.(IB) (Sem. - I)
 • Dr. Nasir Shaikh • Dr. Sambhaji G. Shinde • Dr. Rajesh Patne
 Choice Based Credit System (CBCS)
 As Per New Syllabus 2019

SUCCESS PUBLICATIONS

All Semesters Available

ISBN : 978-93-89066-52-4



SUCCESS PUBLICATIONS

PT-3703

Address : Radha Krishna Apartment, 535, Shaniwar Peth, Appa Balwant Chowk, Opp. Prabhat Theatre, Pune - 30.
 Ph. No. 24434662, Mobile : 9325315464
 E-mail : sharpgroup31@rediffmail.com
 Website : www.sharpmultinational.com

Published by
Dr. Rajesh M. Patne
Success Publications
Radha Krishna Apartment, 535, Shaniwar Peth,
Appa Balwant Chowk, Opp. Prabhat Talkies, Pune - 411 030.
Ph. 24434662 Mobile : 9325315464.

❦❦❦❦❦

Copyrights

With the Publisher

❦❦❦❦❦

Printed at

Success Publications

S.No. 30/27, Laxmi Industrial Estate, Near Prabhat News Paper,
Dhayari, Pune-41. Mobile : 9028211751

❦❦❦❦❦

Edition

2019

❦❦❦❦❦

Edited By

Miss. Rajashree Patne

❦❦❦❦❦

Typesetting, Layout

Miss. Varsha Lokhande, Miss. Rajashri Sul

❦❦❦❦❦

Cover Designing

Mrs. Aparna Mali

❦❦❦❦❦

ISBN NO. - 978-93-89066-52-4

No part of this book may be reproduced or copied in any form or by any means [graphic, electronic or mechanical, including photocopying, recording, taping, or information retrieval systems] or reproduced on any disc, tape, perforated media or other information storage device, etc., without the written permission of the publishers.

Every effort has been made to avoid errors or omissions in this book. In spite of this errors may creep in. Any mistake, error or discrepancy noted may be brought to our Notice which shall be taken care of in the next edition. It is Notified that publisher shall not be responsible for any damage or loss of action to anyone of any kind in any manner, therefrom. It is suggested to all the readers, always refer original references wherever necessary.

Syllabus

B.B.A.\B.B.A. (IB) (Sem. - I) Business Accounting

Unit	Topic
1	Financial Accounting Definition and Scope, objectives, Accounting concepts, principles and conventions. Classification of accounts
2	Accounting Transactions and Final Accounts Problems on Voucher system; Accounting Process, Journals, Ledger, Cash Book , subsidiary books , Trial Balance preparation of Final Accounts of Sole Proprietorship(Trading and Profit & Loss Account and Balance Sheet)
3	Bank Reconciliation Statements Meaning, importance and preparation of Bank Reconciliation Statement
4	Computerised Accounting Role of computers and Financial application, Accounting Software packages

INDEX

Business Accounting

Unit No.	Contents	Page No.
1	Financial Accounting	1.1 to 1.21
	<ul style="list-style-type: none">■ 1.1 Financial Accounting■ 1.2 Accounting Concepts■ 1.3 Accounting Principles■ 1.4 Accounting Conventions■ 1.5 Classification of Accounts	
2	Accounting Transactions and Final Accounts	2.1 to 2.114
	<ul style="list-style-type: none">■ 2.1 Voucher System■ 2.2 Methods of Accounting■ 2.3 Accounting Process■ 2.4 Meaning of Debit and Credit■ 2.5 Accounting Equation■ 2.6 Major Accounting Terms■ 2.7 Journal■ 2.8 Ledger■ 2.9 Cash Book■ 2.10 Subsidiary Books■ 2.11 Trial Balance■ 2.12 Trading Account■ 2.13 Profit and Loss Account■ 2.14 Balance sheet of sole Proprietor	

3	Bank Reconciliation Statement	3.1 to 3.26
	<ul style="list-style-type: none"> ■ 3.1 Meaning ■ 3.2 Need of A Bank Reconciliation Statement ■ 3.3 Importance of Bank Reconciliation Statement ■ 3.4 Reasons for Difference in Bank Reconciliation ■ 3.5 Different Situations for Preparing the Bank Reconciliation Statement ■ 3.6 Preparation of Bank Reconciliation Statement 	
4	Computerised Accounting	4.1 to 4.39
	<ul style="list-style-type: none"> ■ 4.1. Computerised Accounting System ■ 4.2. Accounting Software Packages ■ 4.3. Consideration for Accounting Package Selection ■ 4.4 Pre-packaged Accounting Software ■ 4.5 Customised Accounting Software ■ 4.6 Accounting Software as Part of Enterprise Resource Planning (ERP) ■ 4.7 Outsourcing of Accounting Function 	

Print Pg + 8/1000
7 color

E·D·U·C·A·R·E

ISBN : 978-93-89493-04-7



Dr. MSG Foundation, Mumbai

2019

EDUCARE is published by
Dr. MSG Foundation,
C/O R. M. Bhat High School Building,
Acharya Donde Nagar,
Parel, Mumbai,
Maharashtra, India
Tel: (022) 24136132

Copyright ©2019 (All Rights Reserved)

- No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, mechanical, photocopying, recording, or otherwise without the prior written permission of the publisher.
- Dr. MSG Foundation holds the copyright to all articles contributed to this publication. In case of reprinting articles, GES holds the copyright for the selection, sequence, introduction, material, summaries and other value additions.
- The views expressed in this publication are purely personal judgements of the authors and do not reflect the view of Dr. MSG Foundation. The views expressed by external authors represent their personal views and not necessarily the views of the organizations they represent.
- All efforts are made to ensure that the published information is correct. Dr. MSG Foundation is not responsible for any errors caused due to oversight or otherwise.

Send your feedback to

'EDUCARE'
Editor-in-Chief
C/O R. M. Bhat High School Building,
Acharya Donde Nagar,
Parel, Mumbai,
Maharashtra, India
Tel: (022) 24136132

Publisher : Academic Book Publications

ISBN 978-93-89493-04-7





EDUCARE - 2019

EDITORIAL BOARD

Editor- In -Chief

Sir Dr. M. S. Gosavi
International Educator
Secretary & Director General, Gokhale Education Society, Nashik-5
Founder Director, JDC Bytco Institute of Management Studies & Research, Nashik-5

Associate Editors

Prin. Dr. Mrs. Deepti Deshpande
Principal & Branch Secretary, SMRK-BK-AK Mahila Mahavidyalaya, Nashik-5
Director - HR, Gokhale Education Society, Nashik-5
Director, YCMOU Post-Graduate Research Programme, Nashik Centre

Prin. Dr. K. R. Shimpi
Ex. Principal, B.Y.K. (Sinnar) College of Commerce, Nashik - 5

Editorial Members

Dr. S. V. Amrutkar
Principal, Sir Dr. M. S. Gosavi College of Pharmaceutical Education & Research, Nashik - 5

Dr. Mrs. Jyoti Thakur
Principal, Sir Dr. M. S. Gosavi Institute of Nursing Education, Training and Research, Nashik-5

Dr. Mahosh Auti
Vice Principal, RNC Arts, JDB Commerce and NSC Science College, Nashik Road

Dr. Pranav Ratnaparakhi
Assistant Professor, H.P.T. Arts & R.Y.K. Science, Nashik-5

Challenges in Pharmacy Education System in India

Asso. Prof. Dr. Manjusha Kulkarni*, Asst. Prof. Priya Sonawani**

Department of Biotechnology, RNC Arts, JDB Comm. and NSC Sci. College, Nashik Road

E-mail : mmkulnashik@gmail.com, priyasonawani@gmail.com

Abstract

Education is meant to prepare an individual for life, equip him physically, intellectually, emotionally and spiritually to deal with the challenges of life with self-assurance, making the right decisions and broadening their perspectives. The main purpose of this study is to understand the problems in the Indian education system, the main areas that have been highlighted are need and significance of education, issues in the Indian Pharmacy education system, challenges in the Indian Pharmacy education system and suggestions for making improvements in the Indian education system related with Pharmacy. The pharmacy practice curriculum has not received much attention. The information presented in this paper may stimulate discussion and critical analysis and planning and will be of importance in further adaptation of the pharmacy education for improvement in educational outcomes.

Key Words : Arithmetic Skills, Pharmacy Education, Curriculum, Critical Analysis etc.

Introduction:

The population of India is approximately 1.2 billion. India is the second most populous country on the planet. In India formal pharmacy education leading to a degree began with the introduction of a four year bachelor of pharmacy (B.Pharm). The education system in India produces millions of graduates each year, many skilled in Information Technology and engineering. Educational programs related to Pharmacy in India are of different kinds such as, diploma in pharmacy (D.Pharm), bachelor of pharmacy (B.Pharm), master of pharmacy (M.Pharm), master of science in pharmacy [MS(Pharm)] and master of technology in pharmacy [(M.Tech (Pharm))] doctor of pharmacy (PharmD), and doctor of philosophy in pharmacy (Ph.D). The entry point for D.Pharm, B.Pharm, and PharmD programs is twelve years of formal education in the sciences. The D.Pharm program requires a minimum of two years of didactic coursework. The B.Pharm involves four years of study in colleges affiliated with universities or in a university department. Students holding a B.Pharm degree can earn an M.Pharm degree in two years, of which the second year is devoted to research leading to a dissertation any pharmaceutical discipline, for instance pharmaceuticals, pharmacology, pharmaceutical chemistry or pharmacognosy. The eligibility for admission is different. Entry requirements also vary depending on the degree program. The majority of privately funded institutions do not have a direct formal application processes. There is no centralized data repository to indicate the number of applicants to private and public institutions in India.

Education has been observed as the crucial development tool. The system of Pharmacy education in India has become a great movement, both in terms of resources allocated and the number of persons involved, these include teachers, students and the administrators.

Issues in the Indian Education System:

The quality of teaching is not well developed. The main factors that lead to the deprived teaching methods are shortage of teachers, the curriculum and the instructional methods are not well developed, the teaching-learning methods are not well organized, lack of appropriate communication between the teachers and the students, lack of modern and innovative techniques and financial problems.(Chahal, 2015).

Financial Constraints – There are many students who belong to minority groups, marginalized and

socio-economically backward sections of the society. Low income of their families and financial constraints serve to be impediments within the course of the acquisition of education. Students usually migrate to urban areas to get enrolled in higher educational institutions and besides, tuition, they have to pay for their living, food, books, e-resources, and other expenses (Challenges in Indian Higher Education, n.d.).

Privatization - Privatization of higher education is actually a new but a wanted trend and is indispensable to sustain resource fulness, adaptableness and superiority. The economic track of liberalization and globalization demands for it. In India, both the public and the private institutions function simultaneously. Almost 50 percent of the higher education in India is imparted through private institutions, primarily unassisted comprising of high cost. (Chahal, 2015).

Challenges in the Indian Education System:

The challenges that the Indian education system are experiencing in the present existence have been stated as follows: (Chahal, 2015).

Economic Difficulties :- Economic difficulties are regarded to be the most imperative transformations that the system of higher education has imposed upon the communities. There are students enrolled in Pharmacy institutions, who belong to minority groups and find it difficult to meet their basic requirements.

Suggestions for making Improvements in the Indian Education System:

The suggestions for leading to improvements in the Indian education system have been generated from various sources and these have been stated as follows: (Singh, n.d.).

Innovative Practices – The emergence of new and modern technologies lead to progress in the present world. It makes available opportunities for economic growth, improved health and nutrition, enhanced delivery of services, improved learning, curriculum and instruction, and socio-cultural advancements. Efforts are required to be made to make innovative practices more usable in the system of education.

International Co-operation –International co-operation is gaining prominence in the development of the Pharmacy education system. With an increase in the development of transport and communication, a global village is witnessing an increasing emphasis on international co-operation and actions are considered necessary to find satisfactory solutions to the problems and higher Pharmacy education is one of them.

Towards a New Vision –The expansion of the education system within the country would largely contribute towards its enrichment, growth and development. The society is influenced by physical, emotional, dynamic, intellectual, ethical, aesthetic and spiritual potentialities. Hence, education will contribute in the development of modern and innovative approaches, strategies and methods that will lead to advancement.

Cross Culture Programs –In India, there are different cultures, castes, religions, races, ethnicities, arts, fields and so forth. Education will enable people to understand and acquire knowledge regarding each other's cultures and backgrounds, so that they will be able to live in unity and will not discriminate against each other.

Action Plan for Improving Quality –To ensure excellence and superiority in all the aspects of academic activities, it is vital to conduct academic and administrative audit once in three years in colleges by experts and professionals. Colleges and the universities should recognize the need and the requirement for quality education that if implemented in a productive manner would lead to progression in the system of education.

World Class Education –There are number of Indian students who are going to foreign universities in the countries like USA, UK, Australia etc. These Universities allow higher education for foreign students through correspondence courses as well. In the same way, Indian Universities also make provision of education to the foreign students. Therefore, adoption of international syllabus is vital within the Pharmacy educational institutions.

Personality Development –The system of education should enable the development of the personality of the individuals in an appropriate manner. It should not just enhance the academic knowledge but

should also facilitate in making the individuals more creative, inventive, resourceful and ingenious. A well educated person is aware of how to communicate and deal with other people at home, workplace and within the community.

Availability of Scholarships – In India, individuals have recognized the significance of education, even those who belong to deprived, marginalized and socio-economically backward sections of the society aspire to attain education. In most cases, finances serve to be the major problems for the individuals who are willing to study, these problems are impediments within the course of their acquisition of education, hence, availability of scholarships and stipends for the students would largely contribute in the attainment of education.

Examinations and Evaluation Techniques – Evaluation techniques are considered imperative, which has the main purpose of assessing the capabilities of the individuals, and how much they have understood. Examinations are considered to be one of the most crucial techniques that assess the position and the performance of the students. The conduct of the examinations should be implemented in a regular and a consistent manner to ensure that students are evaluated in every area. Their weaknesses are adequately identified and then there should be implementation of appropriate measures to improve them.

High-Tech Libraries - In some parts of the country, in educational institutions, libraries are in an underdeveloped state. It is vital to ensure that whether libraries are well developed, organized in an appropriate manner and possess all the required materials relating to all the subjects that are vital for the individuals. In the present existence, in most cases, students depend upon the libraries besides the internet.

Conclusion:

Education is vital for every person in order to enable him for better living conditions. Obtaining of good quality education will contribute in securing a job, making individuals aware of various aspects, inculcating the traits of morality, ethics, decency and graciousness within oneself and rendering an effective contribution in the development of their personalities.

Pharmacy education in India, both at the B.Pharm and M.Pharm levels, is taught as an industry- and product oriented profession with a focus on the basic sciences. During the past decade, pharmacy education has expanded significantly in terms of number of institutions offering pharmacy program at various levels. However, pharmacy education in India continues to be one of the last options for students aspiring to a university degree. The pharmacists with B.Pharm or M.Pharm generally seek avenues other than pharmacy practice. These pharmacists prefer placements in production, regulatory affairs, management and/ or quality assurance, and marketing with the pharmaceutical industry. Only small numbers of these graduates and postgraduates opt to work in community and institutional pharmacies. In India, diploma holders (D.Pharm holders) are practicing pharmacists in the global sense as they engage in community or institution pharmacy practice.

In order to enhance the education system within the country, there are suggestions that have been made; towards a learning society, connection between industry and academics, incentives to teachers and researchers, innovative practices, mobilization of resources, advancement of the information age, student centred education and dynamic methods, public private partnership, provision of need based job oriented courses, international co-operation, towards a new vision, cross culture programs, action plan for improving quality, individuality, privatization of higher education, quality development, personality development, status of academic research studies, availability of scholarships, fair quality assurance system, to increase quantity of universities, examinations and evaluation techniques, and hi-tech libraries.

In order to demonstrate the requirements for pharmacists in India, it is necessary to undertake a pharmacy work force study, to review pharmacy education programs, and to compare them with the roles that have been accepted internationally. Then, to design and develop pharmacy degree Programs perhaps one program exclusively for industry and another for practice.

References:

1. Agarwal P. Higher education in India: need for change. http://www.icrier.org/pdf/ICRIER_WP180_Higher_Education_in_India_.pdf. Accessed April 14, 2010
2. Chahal, M. (2015). Higher Education in India: Emerging Issues, Challenges and Suggestions. *International Journal of Business Quantitative Economics and Applied Management Research*, 1(11), 67-74. Retrieved September 19, 2017 from http://ijbemr.com/wpcontent/uploads/2015/05/Higher_Education_in_India_Emerging_Issues_Challenges_and_Suggestions.pdf
3. Chakrabarty, K.C. (2011). Indian education system – Issues and Challenges. Retrieved ,September 19, 2017 from <http://www.bis.org/review/r110809b.pdf>
- Challenges in Indian Higher Education – Indian Context. (n.d.). Retrieved September 19, 2017 from http://shodhganga.inflibnet.ac.in/bitstream/10603/12644/8/08_chapter%204.pdf
4. Lall, M. (2005). The Challenges for India's Education System. Retrieved September 19, 2017 from <http://marielall.com/wp/wp-content/uploads/Chatham-house-indiaeducation.pdf>
5. Kaul R. History of modern pharmacy in India: a review of the work of Professor Harkishan Sing. *Pharm Hist.* 2009;54(1);34-42.
6. Singh, J.D. (n.d.). Higher Education in India – Issues, Challenges and Suggestions. Retrieved September 19, 2017 from <http://www.gvctesangaria.org/websiteimg/publications/jdarticle.pdf>
7. Thanky, P. (2013). Education System in Present Scenario: Problems & Remedies. *Indian Journal of Applied Research*, 3(7), 166-167. Retrieved September 19, 2017 from [https://www.worldwidejournals.com/indian-journal-of-applied-research-\(IJAR\)/file.php?val=July_2013_1372686339_45dd6_49.pdf](https://www.worldwidejournals.com/indian-journal-of-applied-research-(IJAR)/file.php?val=July_2013_1372686339_45dd6_49.pdf).
8. Varghese, N.V., & J.B.G. Tilak. (1991). The financing of education in India. International Institute for Educational Planning. Retrieved September 19, 2017 from <http://unesdoc.unesco.org/images/0009/000902/090282eo.pdf>

E·D·U·C·A·R·E

Print Pg + 8/1000
7 color

ISBN : 978-93-89493-04-7



Dr. MSG Foundation, Mumbai

2019

Need of Leadership Programs in Health Care Education

Asso. Prof. Dr. Manjusha M.Kulkarni*, **Asst. Prof. Dr. Jayalekshmi G. Kurup****

*Vice-Principal & Co-ordinator, Department of Biotechnology,
RNC Arts, JDB Comm. & NSC Sci. College, Nashik Road

**Department of Biotechnology, RNC Arts, JDB Comm. and NSC Sci. College, Nashik Road
E-mail : mmkulnashik@gmail.com, jeyley06@gmail.com

Abstract

Today's healthcare landscape is a dynamic, unpredictable sea of legislative and economic transformation. Healthcare leaders, namely those in administrative and management roles, need a wide range of operational, relational and analytical skills to effectively carry out their responsibilities. Healthcare administrators' abilities to do their jobs well, directly affect the quality and availability of affordable healthcare. Healthcare administrators are often required to maintain and develop professional standards, procedures and policies for various institutional activities. These healthcare leaders are also responsible for developing and expanding programs for scientific research, preventive medicine, medical and vocational rehabilitation and community health and welfare.

Key Words : Healthcare Education, Leadership, Skills etc.

Introduction:

The curriculum in health care leadership is designed to prepare students for leadership positions in the health care industry. Students study leadership and administration, human resources, public policy, epidemiology, law and ethics in a health care context. Key policies, principles and practices of health care administration and leadership are explored within the context of personal and professional development. Leadership studies program is based on the conviction that leaders must learn to lead change so that services and deliverables are effectively, ethically and efficiently delivered to an increasingly diverse population, in the context of a changing economy and rapidly developing technologies. The leadership focuses on the fulfillment of practitioner needs by linking up theory to the best practices of leadership. The leadership skills that students develop while pursuing a program in leadership are transferrable across all types of organizations - private, for profit, nonprofit and public. It prepares the students to lead organizational change and innovation, while managing the challenges of continuous change and global competition. Students who pursue their master's in leadership may be working as or want to pursue careers such as information officers, strategic planners, project managers, sales directors, military officers, hospital administrators and religious leaders.

Core Qualities of a Leader

While salaries vary based on industry, experience and geographical location, the following qualities are essential. Leadership skills that are relevant and necessary for all organizations. One can acquire leadership and managerial skills with special emphasis on communication, problem-solving and decision-making.

The basic qualities of a leader are-

- **Communication Skills:** Top executives must be able to communicate clearly and persuasively. They must effectively discuss issues and negotiate with others, direct subordinates and explain their policies and decisions to those within and outside the organization.
- **Decision-Making Skills:** Top executives need decision-making skills when framing the policies

and managing an organization. They must assess different options and choose the best course of action, often daily.

- **Leadership Skills:** Top executives must be able to lead a successful organization by coordinating policies, people and resources.
- **Management Skills:** Top executives must organize and direct the operations of an organization. For example, they must manage business plans, employees and budgets.
- **Problem Solving Skills:** Top executives need problem-solving skills after identifying issues within an organization. They must be able to recognize shortcomings and effectively carry out solutions.

Need of Leadership in Health Care Education

Leaders need to be forward thinkers, innovators, sensitive, flexible and able to adapt to the demands and expectations of stakeholders. Health care leaders make decisions that shape caregiving. They help team members and organizations perform optimally in a constantly evolving environment. These professionals may oversee business units such as operations, human resources, accounting or oversee specific disciplines or regions. These professionals possess special talents that give them an ability to guide individuals, groups and organizations through challenges. They understand others beyond the expressions gleaned from direct statements by dedicating time to understand the individuals they interact with daily. Effective health care leaders also recognize how technological innovation supports positive patient outcomes and equips frontline caregivers with the latest available hi-tech tools. Through professional resources, leaders gather intelligence and build networks to help care-giving organizations achieve their objectives. Leaders use these skills, tools and connections to make countless daily decisions affecting a health care organization's service quality.

Effective Health Care Leadership Skills

Today's dynamic healthcare landscape calls for highly educated and motivated administrators who maintain cutting-edge information system skills and managerial expertise as they oversee huge healthcare operations. A strong business orientation, paired with sharp leadership and communication skills are critical for today's healthcare administrator (Michelle Balash, 2018). Current healthcare landscape is a dynamic, unpredictable sea of legislative and economic transformation. Healthcare leaders, namely those in administrative and management roles, need a wide range of operational, relational, and analytical skills to effectively carry out their responsibilities. Healthcare administrators' abilities to do their jobs well, directly affect the quality and availability of affordable healthcare.

Traits of highly successful general and specialized healthcare industry leaders include-

- **Having a strong business orientation:** Private healthcare is more than a calling; it's also a business that needs to accomplish financial goals and stay out of the red.
- **Maintaining a positive attitude:** This keeps workplace morale up. Leaders have dreams and goals for their staff and spreading positivity helps create an environment where these visions can come to pass.
- **Varying work hours acceptance:** Nurses and doctors work 24x7, emergency situations that call on the insurance and medical financing expertise of healthcare administrators don't may occur at any point in the day.
- **Willingness to out-market the competition:** Administrators with a proactive approach to marketing will ensure success of the organization.
- **Approaching work proactively:** Managers lead by example and a proactive attitude is contagious in the workplace. Staying motivated and encouraging others to perform at their best is crucial for reaching goals and maintaining quality patient care.
- **Having strong leadership skills:** Leaders have to focus on how well employees are performing and evaluating healthcare processes. Possessing the confidence to independently direct the organization and make important decisions to benefit overall patient care.

- Making strong employment decisions: In the name of good time management, managers task is to prepare the employees with the jobs that they are most capable of handling efficiently.
- Understanding priorities and staying organized: Overseeing use of information data systems, computer programs and healthcare machines require extensive organizational habits and ruthless prioritization.
- Improving themselves and their staff consistently: Leaders should continuously push for improved hospital procedures and strive for higher quality patient care. Implementing and working to accomplish set goals can increase team collaboration and build relationships.
- Being available to, professional and honest with their staff: Being an accessible and efficient leader who fulfills his or her duties while assisting others will create bonds of trust between administrators and staff.
- Continuing an education: Professionals never stop learning and a voracious appetite for up-to-the-minute information and research about modern healthcare issues in technology, economics, finance, management or legal and ethical issues will keep an administrator relevant to the industry.

A Healthcare Leader's Effectiveness:

Healthcare service managers have a variety of tasks, skills, knowledge and expertise required to fulfill day-to-day responsibilities. Certain operational skills are crucial to an effective leader. Healthcare administrators are often required to maintain and develop professional standards, procedures and policies for various institutional activities. These healthcare leaders are also responsible for developing and expanding programs for scientific research, preventive medicine, medical and vocational rehabilitation and community health and welfare.

Excellent, assertive communication skills, both verbal and written, are paramount to a leader's ability to carry out an effective healthcare operation. Current computer skills and technology-based training are also essential as healthcare machinery and information systems continue to evolve.

Some other operational skills necessary to the Healthcare leader's job include-

- Information systems management and troubleshooting
- Maintain awareness of advances in data processing technology, medicine, computerized diagnostic and treatment equipment, financing options and health insurance changes
- Logistics and research
- Patient administration
- Maintain quality of service offered to patients
- Team performance measurement and motivation
- Facilities development and enhancement
- Project and operations management

A large part of a healthcare administration is financially and managerially focused, as most of healthcare administrators work in an office environment. They are in charge of managing hospitals, community health centers, clinics, private medical group practices, managed care organizations, nursing homes and other health care facilities (Daly *et al.*, 2014). Analytical skills necessary to responsibly manage the business side of a clinic, hospital or other healthcare-based companies include-

- Fiscal operations, which can span from accounting, planning budgets, planning and authorizing to expenditures, establishing rates for services and coordinating financial reporting
- Economic knowledge and insight
- Consultation
- Supply ordering and inventory management
- Human resources management
- Direction, supervision and evaluation of medical, technical, nursing, service, clerical, maintenance and other personnel
- Education and training management

- Public relations and marketing
- Knowledge of current government regulations, legal and ethical practices, policies and standards
- Strategic planning
- Development and execution of organizational procedures

Successful healthcare administrators also have strong interpersonal skills to fulfill their relational responsibilities-

- Internal communication management
- Develop interviewing processes
- Direct and conduct recruitment, hiring and training of personnel
- Develop coaching strategies
- Limit conflict and encouraging workplace unity
- Overcome barriers in communication with staff and outside healthcare administrators

Conclusion:

Healthcare managers of all levels and specializations are critical to guarantee a hospital functions on a competitive, effective, profitable and satisfactory basis. Healthcare education should focus on developing leaders who are highly efficient, knowledgeable and adapt with strong interpersonal skills and managerial abilities. Courses in Health Care Administration should be made available to the students. Such leadership-oriented program prepares students for a career in this field, so that they can grab employers' attention and jump-start successful healthcare administration career.

References:

- Michelle Balash (2018) The 5 Most Important Skills for Healthcare Leaders, People Fluent
- Peter Economy , Top 10 Skills Every Great Leader Needs to Succeed, Newsletter INC.com.
- Daly J, Jackson D, Mannix J, Davidson PM, Hutchinson M, (2014). The importance of clinical leadership in the hospital setting, Dovepress
- <https://programs.online.utica.edu/articles/effective-health-care-leadership-skills>
- <https://www.healthcare-administration-degree.net/>
- National Center for Healthcare Leadership

A Text Book for F.Y.B.Sc./F.Y.B.A. Mathematics
(2019 Pattern)

As Per Choice Based Credit System (CBCS)

PAPER - I : MT-111 (Credit 2)

ALGEBRA

Dr. S. B. Gaikwad

*Head Arts, Commerce and Science College
Karmadrop*

Dr. K. C. Takale

*PNC Arts, JDB Commerce and NSC Science College
Nashik Road, Nashik*

Dr. V. S. Jadhav

*Nonstop Media College
Pune*

Dr. P. G. Jadhav

*Hon. Balasahed Jadhav
Arts, Commerce and Science College
Aje, Junnar, Pune*

Prof. S. M. Waingade

*Ex. HOD, Sri. Chhatrapati Shriji Maharajajyoti Srigonda
Karmadrop*

Prof. S. R. Patil

*Ex. HOD, S. M. Joshi College
Hadapsar, Pune*

Price ₹ 125.00

 **GOLDEN
SERIES**
by, **NIRALI**

N5024



ALGEBRA

First Edition : July 2019
 Authors

The text of this publication or any part thereof, should not be reproduced or transmitted in any form or stored in any computer storage system or device for distribution including photocopy, recording, taping or information retrieval system or reproduced on any disc, tape, perforated media or other information storage device etc. without the written permission of Authors with whom the rights are reserved. Breach of this condition is liable for legal action.
 Even effort has been made to avoid errors or omissions in this publication. In spite of this, errors may have crept in. Any mistake, error or discrepancy noted and shall be brought to our notice shall be taken care of in the next edition. It is notified that neither the publisher nor the authors or seller shall be responsible for any damage or loss of action to any one, of any kind, in any manner, therefrom.

Polyplate

Published By :
NIRALI PRAKASHAN
 Abhyudaya Pragati, 1312, Shivaji Nagar
 Off. J.M. Road, PUNE - 411005
 Tel - (020) 25512336/37/39, Fax - (020) 25511379
 Email : niralipune@pragationline.com

Printed By
YOGIRAJ PRINTERS AND BINDER
 Survey No. 10/1A, Ghule Industrial Estate
 Nanded Gaon Road
 Nanded, Pune - 41104
 Mobile No. 9404233041/985004651

DISTRIBUTION CENTRES**PUNE**

Nirali Prakashan : 119, Budhwar Peth, Jogeshwari Mandir Lane, Pune 411002, Maharashtra
 (For orders within Pune) - Tel : (020) 2445 2044, Fax : (020) 2445 1538; Mobile : 9657703145
 Email : niralilocal@pragationline.com

Nirali Prakashan : S. No. 28/27, Dhayari, Near Asian College Pune 411041
 (For orders outside Pune) Tel : (020) 24690204 Fax : (020) 24690316; Mobile : 9657703143
 Email : bookorder@pragationline.com

MUMBAI

Nirali Prakashan : 385, S.V.P. Road, Rasdhara Co-op. Hsg. Society Ltd.,
 Girgaum, Mumbai 400004, Maharashtra; Mobile : 9320129587
 Tel : (022) 2385 6339 / 2386 9976, Fax : (022) 2386 9976
 Email : niralimumbai@pragationline.com

DISTRIBUTION BRANCHES**JALGAON**

Nirali Prakashan : 34, V. V. Golani Market, Navi Peth, Jalgaon 425001, Maharashtra.
 Tel : (0257) 222 0395, Mob : 94234 91860; Email : niralijalgaon@pragationline.com

KOLHAPUR

Nirali Prakashan : New Mahadvar Road, Kedar Plaza, 1st Floor Opp. IDBI Bank, Kolhapur 416 012
 Maharashtra. Mob : 9850046155; Email : niralikolhapur@pragationline.com

NAGPUR

Nirali Prakashan : Above Maratha Mandir, Shop No. 3, First Floor,
 Rani Jhanshi Square, Sitabuldi, Nagpur 440012, Maharashtra
 Tel : (0712) 254 7129; Email : niralinagpur@pragationline.com

DELHI

Nirali Prakashan : 4593/15, Basement, Agarwal Lane, Ansari Road, Daryaganj
 Near Times of India Building, New Delhi 110002 Mob : 08505972553
 Email : niralidelhi@pragationline.com

BENGALURU

Nirali Prakashan : Maitri Ground Floor, Jaya Apartments, No. 99, 6th Cross, 6th Main,
 Malleswaram, Bengaluru 560003, Karnataka; Mob : 9449043034
 Email : niralibangalore@pragationline.com

Other Branches : Hyderabad, Chennai

Note : Every possible effort has been made to avoid errors or omissions in this book. In spite this, errors may have crept in. Any type of error or mistake so noted, and shall be brought to our notice, shall be taken care of in the next edition. It is notified that neither the publisher, nor the author or book seller shall be responsible for any damage or loss of action to any one of any kind, in any manner, therefrom. The reader must cross check all the facts and contents with original Government notification or publications.

niralipune@pragationline.com | www.pragationline.com

Also find us on f. www.facebook.com/niralibooks

A Text Book for F.Y.B.Sc./F.Y.B.A. Mathematics
(2019 Pattern)

As Per Choice Based Credit System (CBCS)

PAPER - II : MT-112 (Credit 2)

CALCULUS - I

Dr. S. B. Gaikwad

New Arts, Commerce and Science College
Ahmednagar

Dr. K. C. Takale

RNC Arts, JDB Commerce and NSC Science College
Nashik Road, Nashik

Dr. V. S. Jadhav

Nowrosjee Wadia College
Pune

Dr. P. G. Jadhav

Hon. Balasaheb Jadhav
Arts, Commerce and Science College
Ale, Junnar, Pune

Prof. S. M. Waingade

Ex. HOD, Shri Chhatrapati Shivaji Mahavidyalaya Shrigonda
Ahmednagar

Prof. S. R. Patil

Ex. HOD., S. M. Joshi College
Hadapsar, Pune

Price ₹ 125.00

Parag P. Ghamandi
Nirali Prakashan
9850490869
nirallprakashan.parag@gmail.com
paragghamandi@gmail.com

 **GOLDEN
SERIES**
by, **NIRALI**

N5025



CALCULUS - I

First Edition : July 2019
 © : Authors

The text of this publication, or any part thereof, should not be reproduced or transmitted in any form or stored in any computer storage system or device for distribution including photocopy, recording, taping or information retrieval system or reproduced on any disc, tape, perforated media or other information storage device etc., without the written permission of Authors with whom the rights are reserved. Breach of this condition is liable for legal action.
 Every effort has been made to avoid errors or omissions in this publication. In spite of this, errors may have crept in. Any mistake, error or discrepancy so noted and shall be brought to our notice shall be taken care of in the next edition. It is notified that neither the publisher nor the authors or seller shall be responsible for any damage or loss of action to any one, of any kind, in any manner, therefrom.

Published By :
NIRALI PRAKASHAN
 Abhyudaya Pragati, 1312, Shivaji Nagar
 Off J.M. Road, PUNE - 411005
 Tel - (020) 25512336/37/39, Fax - (020) 25511379
 Email : niralipune@pragationline.com

Polyplate

Printed By :
YOGIRAJ PRINTERS AND BINDERS
 Survey No. 10/1A, Ghule Industrial Estate
 Nanded Gaon Road
 Nanded, Pune - 411041
 Mobile No. 9404233041/9850046517

➤ **DISTRIBUTION CENTRES**

PUNE

- Nirali Prakashan** : 119, Budhwar Peth, Jogeshwari Mandir Lane, Pune 411002, Maharashtra
 (For orders within Pune) Tel : (020) 2445 2044, Fax : (020) 2445 1538; Mobile : 9657703145
 Email : niralilocal@pragationline.com
- Nirali Prakashan** : S. No. 28/27, Dhayari, Near Asian College Pune 411041
 (For orders outside Pune) Tel : (020) 24690204 Fax : (020) 24690316; Mobile : 9657703143
 Email : bookorder@pragationline.com

MUMBAI

- Nirali Prakashan** : 385, S.V.P. Road, Rasdhara Co-op. Hsg. Society Ltd.,
 Girgaum, Mumbai 400004, Maharashtra; Mobile : 9320129587
 Tel : (022) 2385 6339 / 2386 9976, Fax : (022) 2386 9976
 Email : niralimumbai@pragationline.com

➤ **DISTRIBUTION BRANCHES**

JALGAON

- Nirali Prakashan** : 34, V. V. Golani Market, Navi Peth, Jalgaon 425001, Maharashtra,
 Tel : (0257) 222 0395, Mob : 94234 91860; Email : niralijalgaon@pragationline.com

KOLHAPUR

- Nirali Prakashan** : New Mahadvar Road, Kedar Plaza, 1st Floor Opp. IDBI Bank, Kolhapur 416 012
 Maharashtra. Mob : 9850046155; Email : niralikolhapur@pragationline.com

NAGPUR

- Nirali Prakashan** : Above Maratha Mandir, Shop No. 3, First Floor,
 Rani Jhanshi Square, Sitabuldi, Nagpur 440012, Maharashtra
 Tel : (0712) 254 7129; Email : niralinagpur@pragationline.com

DELHI

- Nirali Prakashan** : 4593/15, Basement, Agarwal Lane, Ansari Road, Daryaganj
 Near Times of India Building, New Delhi 110002 Mob : 08505972553
 Email : niralidelhi@pragationline.com

BENGALURU

- Nirali Prakashan** : Maitri Ground Floor, Jaya Apartments, No. 99, 6th Cross, 6th Main,
 Malleswaram, Bengaluru 560003, Karnataka; Mob : 9449043034
 Email : niralibangalore@pragationline.com

Other Branches : Hyderabad, Chennai

Note : Every possible effort has been made to avoid errors or omissions in this book. In spite this, errors may have crept in. Any type of error or mistake so noted, and shall be brought to our notice, shall be taken care of in the next edition. It is notified that neither the publisher, nor the author or book seller shall be responsible for any damage or loss of action to any one of any kind, in any manner, therefrom. The reader must cross check all the facts and contents with original Government notification or publications.

niralipune@pragationline.com | www.pragationline.com

Also find us on .f. www.facebook.com/niralibooks

A Text Book for F.Y.B.Sc./F.Y.B.A.
Semester - II
MATHEMATICS PAPER - I : MT-121 (Credit 2)
Choice Based Credit System (CBCS)(2019 Pattern)

ANALYTICAL GEOMETRY

Dr. Shrikisan Gaikwad

M.Sc., B.Ed., M.Phil., Ph.D.
New Arts, Commerce and Science College
Ahmednagar

Dr. Pravin Jadhav

M.Sc., Ph.D.
Hon. Balasaheb Jadhav Arts, Commerce & Science College
Ale, Junnar, Pune

Prof. Veena P. Kshirsagar

M.Sc., M.Phil., Ph.D.
MIT World Peace University
Kothrud, Pune

Dr. Kalyanrao Takale

M.Sc., B.Ed., Ph.D.
RNC Arts, JDB Commerce and NSC Science College
Nashik Road, Nashik

Dr. Vikas Jadhav

M.Sc., Ph.D.
Nowrosjee Wadia College
Pune

Prof. S. R. Patil

M.Sc.
Ex. HOD, S.M. Joshi College
Hadapsar, Pune

Prof. S. M. Waingade

Ex. HOD, Shri. Chhatrapati Shivaji Mahavidyalaya
Shrigonda, Ahmednagar

Price ₹ 120.00

SP
Parag P. Ghamanani
Nirali Prakashan
9850499869
nirali.prakashan.parag@gmail.com
paragghamanani@gmail.com

 **GOLDEN
SERIES**
by, **NIRALI**

N5040



ANALYTICAL GEOMETRY

First Edition December 2019
Author

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage or retrieval system, without prior permission in writing from the publisher. In case of any dispute, the rights are reserved for the publisher. In case of any dispute, the rights are reserved for the publisher. In case of any dispute, the rights are reserved for the publisher.

Published By
NIRALI PRAKASHAN
20/1, Sector 10, Vashi, Mumbai - 401302
Tel: (022) 25511379, Fax: (022) 25511379
Email: niralipune@pragationline.com

Polyplate

Printed By
YOGIRAJ PRINTERS AND BINDERS
Survey No. 10/1A, Ghule Industrial Estate,
Banded Gaur Road,
Banded, Pune - 411041
Mobile No: 9404233042, 9850046155

> DISTRIBUTION CENTRES

PUNE

Nirali Prakashan : 118, Budhwar Peth, Jogeshwari Mandir Lane, Pune 411002, Maharashtra
(For orders within Pune) Tel: (020) 2445 2044, Mobile: 9657703145
Email: niralilocal@pragationline.com

Nirali Prakashan : S. No. 25/27, Dhavali, Near Assan College Pune 411041
(For orders outside Pune) Tel: (020) 24690204, Mobile: 9657703143
Email: bookorder@pragationline.com

MUMBAI

Nirali Prakashan : 385, S.V.P. Road, Rasdhara Co-op Hsg. Society Ltd.,
Gurgaum, Mumbai 400004, Maharashtra, Mobile: 9320129587
Tel: (022) 2385 6339 / 2386 9976, Fax: (022) 2386 9976
Email: niralimumbai@pragationline.com

> DISTRIBUTION BRANCHES

JALGAON

Nirali Prakashan : 34, V.V. Golani Market, Nav Peth, Jalgaon 425001, Maharashtra,
Tel: (0257) 222 0395, Mob: 94234 91860, Email: niralijalgaon@pragationline.com

KOLHAPUR

Nirali Prakashan : New Mahadwar Road, Kedar Plaza, 1st Floor Opp. IDBI Bank, Kolhapur 416 012
Maharashtra, Mob: 9850046155, Email: niralikolhapur@pragationline.com

NAGPUR

Nirali Prakashan : Above Maratha Mandir, Shop No. 3, First Floor,
Ravi Jhanshi Square, Sitabuldi, Nagpur 440012, Maharashtra
Tel: (0712) 254 7129, Email: niralinagpur@pragationline.com

DELHI

Nirali Prakashan : 4593/15, Basement, Agarwal Lane, Ansan Road, Daryaganj
Near Times of India Building, New Delhi 110002, Mob: 08505972553
Email: niralidelhi@pragationline.com

BENGALURU

Nirali Prakashan : Main Ground Floor, Jaya Apartments, No. 99, 6th Cross, 6th Main,
Malleswaram, Bengaluru 560003, Karnataka, Mob: 9449043034
Email: niralibangalore@pragationline.com

Other Branches : Gujarat, Kolkata, Hyderabad, Chennai

Note: Every possible effort has been made to avoid errors or omissions in this book. In spite of this, errors may have crept in. Any type of error or mistake so noted and shall be brought to our notice shall be taken care of in the next edition. It is notified that neither the publisher nor the author or book seller shall be responsible for any damage or loss of action of any kind of any kind in any manner whatsoever. The reader must cross check all the facts and contents with original Government publications.

niralipune@pragationline.com | www.pragationline.com

Also find us on www.facebook.com/niralibooks

A Text Book for F.Y.B.Sc./F.Y.B.A.
Semester - II
MATHEMATICS PAPER - II : MT-122 (Credit 2)
Choice Based Credit System (CBCS)(2019 Pattern)

CALCULUS - II

Dr. Shrikisan Gaikwad

M.Sc., B.Ed., M.Phil., Ph.D.
New Arts, Commerce and Science College
Ahmednagar

Dr. Pravin Jadhav

M.Sc., Ph.D.
Hon. Balasaheb Jadhav Arts, Commerce & Science College
Ale, Junnar, Pune

Prof. Veena P. Kshirsagar

M.Sc., M.Phil., Ph.D.
MIT World Peace University
Kothrud, Pune

Prof. S. M. Waingade

Ex. HOD, Shri. Chhatrapati Shivaji Mahavidyala
Shrigonda, Ahmednagar

Dr. Kalyanrao Takale

M.Sc., B.Ed., Ph.D.
RNC Arts, JDB Commerce and NSC Science College
Nashik Road, Nashik

Dr. Vikas Jadhav

M.Sc., Ph.D.
Nowrosjee Wadia College
Pune

Prof. S. R. Patil

M.Sc.
Ex. HOD., S.M. Joshi College
Hadapsar, Pune

Price ₹ 140.00

 **GOLDEN
SERIES**
by, **NIRALI**


Parag P. Ghamand
Nirali Prakashan
9850490869
nirali.prakashan.parag@gmail.com
paragghamandi@gmail.com

N5041

CALCULUS - II

First Edition : December 2019
C : Authors

The text of this publication or any part thereof should not be reproduced or transmitted in any form or stored in any computer storage system or device for distribution including photocopy, recording, taping or information retrieval system or reproduced on any disc, tape, perforated media or other information storage device etc. without the written permission of Authors with whom the rights are reserved. Breach of this condition is liable for legal action. Every effort has been made to avoid errors or omissions in this publication. In spite of this, errors may have crept in. Any mistake, error or discrepancy so noted and shall be brought to our notice shall be taken care of in the next edition. It is notified that neither the publisher nor the authors or seller shall be responsible for any damage or loss of action to any one of any kind, in any manner, therefrom.

Polyplate

Published By :
NIRALI PRAKASHAN
Abhyudaya Pragati, 1312, Shivaji Nagar
Off JM Road PUNE - 411005
Tel - (020) 25512336/37/39. Fax - (020) 25511379
Email : niralipune@pragationline.com

Printed By :
YOGIRAJ PRINTERS AND BINDERS
Survey No. 10/1A, Ghule Industrial Estate
Nanded Gaon Road
Nanded, Pune - 411041
Mobile No. 9404233041/9850046517

> **DISTRIBUTION CENTRES**

PUNE

Nirali Prakashan : 119, Budhwar Peth, Jogeshwari Mandir Lane, Pune 411002, Maharashtra
(For orders within Pune) Tel : (020) 2445 2044, Mobile : 9657703145
Email : niralilocal@pragationline.com

Nirali Prakashan : S. No. 28/27, Dhayari, Near Asian College Pune 411041
(For orders outside Pune) Tel : (020) 24690204; Mobile : 9657703143
Email : bookorder@pragationline.com

MUMBAI

Nirali Prakashan : 385, S.V.P. Road, Rasdhara Co-op. Hsg. Society Ltd.,
Girgaum, Mumbai 400004, Maharashtra; Mobile : 9320129587
Tel : (022) 2385 6339 / 2386 9976, Fax : (022) 2386 9976
Email : niralimumbai@pragationline.com

> **DISTRIBUTION BRANCHES**

JALGAON

Nirali Prakashan : 34, V. V. Golani Market, Navi Peth, Jalgaon 425001, Maharashtra,
Tel : (0257) 222 0395, Mob : 94234 91860; Email : niralijalgaon@pragationline.com

KOLHAPUR

Nirali Prakashan : New Mahadvar Road, Kedar Plaza, 1st Floor Opp. IDBI Bank, Kolhapur 416 012
Maharashtra. Mob : 9850046155; Email : niralikolhapur@pragationline.com

NAGPUR

Nirali Prakashan : Above Maratha Mandir, Shop No. 3, First Floor,
Rani Jhanshi Square, Sitabuldi, Nagpur 440012, Maharashtra
Tel : (0712) 254 7129; Email : niralinagpur@pragationline.com

DELHI

Nirali Prakashan : 4593/15, Basement, Agarwal Lane, Ansari Road, Daryaganj
Near Times of India Building, New Delhi 110002 Mob : 08505972553
Email : niralidelhi@pragationline.com

BENGALURU

Nirali Prakashan : Maitri Ground Floor, Jaya Apartments, No. 99, 6th Cross, 6th Main,
Malleswaram, Bengaluru 560003, Karnataka; Mob : 9449043034
Email : niralibangalore@pragationline.com

Other Branches : Gujarat, Kolkata Hyderabad, Chennai

Note : Every possible effort has been made to avoid errors or omissions in this book. In spite this, errors may have crept in. Any type of error or mistake so noted, and shall be brought to our notice, shall be taken care of in the next edition. It is notified that neither the publisher, nor the author or book seller shall be responsible for any damage or loss of action to any one of any kind, in any manner, therefrom. The reader must cross check all the facts and contents with original Government notification or publications.

niralipune@pragationline.com | www.pragationline.com

Also find us on  www.facebook.com/niralibooks

66776

A Manual for F.Y.B.Sc. / F.Y.B.A. &
F.Y.B.Sc. (Computer Science) Mathematics

ALGEBRA AND CALCULUS USING MAXIMA SOFTWARE

512
TAK

Dr. K. C. Takale

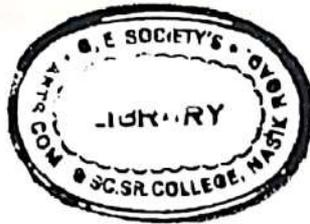
RNC Arts, JDB Commerce and NSC Science College
Nashik Road, Nashik

Dr. A. S. Shaikh

AKI's, Poona College of Arts, Science and Commerce
Pune

Dr. V. S. Jadhav

Nowrosjee Wadia College
Pune



Dr. S. B. Gaikwad

New Arts, Commerce and Science College
Ahmednagar

Prof. S. R. Patil

Ex. HOD., S. M. Joshi College
Hadapsar, Pune

66776

Price ₹ 130.00

 **GOLDEN
SERIES**
by, **NIRALI**

N5105

First Edition : July 2019

© : Authors

The text of this publication, or any part thereof, should not be reproduced or transmitted in any form or stored in any computer storage system or distribution including photocopy, recording, taping or information retrieval system or reproduced on any disc, tape, perforated media or other information storage device etc., without the written permission of Authors with whom the rights are reserved. Breach of this condition is liable for legal action.

Every effort has been made to avoid errors or omissions in this publication. In spite of this, errors may have crept in. Any mistake, error or misprint noticed and shall be brought to our notice shall be taken care of in the next edition. It is notified that neither the publisher nor the authors or seller shall be responsible for any damage or loss of action to any one, of any kind, in any manner, therefrom.

Published By :

NIRALI PRAKASHAN

Abhyudaya Pragati, 1312, Shivaji Nagar

Off J.M. Road, PUNE - 411005

Tel - (020) 25512336/37/39

Email : niralipune@pragationline.com

Polyplate

Printed By

YOGIRAJ PRINTERS AND BINDERS

Survey No. 10/1A, Ghole Industrial Estate

Hatched Cross Street

Hatched, Pune - 411005

Mobile No. 9402330011/9822555511

> DISTRIBUTION CENTRES**PUNE****Nirali Prakashan** : 119, Budhwar Peth, Jogeshwari Mandir Lane, Pune 411002, Maharashtra

(For orders within Pune) Tel : (020) 2445 2044, Mobile : 9657703145

Email : niralifocal@pragationline.com

Nirali Prakashan : S. No. 28/27, Dhayari, Near Asian College Pune 411041

(For orders outside Pune) Tel : (020) 24690204, Mobile : 9657703143

Email : bookorder@pragationline.com

MUMBAI**Nirali Prakashan** : 385, S.V.P. Road, Rasdhara Co-op Hsg. Society Ltd.,
Girgaum, Mumbai 400004, Maharashtra; Mobile : 9320129527

Tel : (022) 2385 6339 / 2386 9976

Email : niralimumbai@pragationline.com

> DISTRIBUTION BRANCHES**JALGAON****Nirali Prakashan** : 34, V. V. Golani Market, Navi Peth, Jalgaon, 425001, Maharashtra,

Tel : (0257) 222 0395, Mob : 94234 91860; Email : niralijalgaon@pragationline.com

KOLHAPUR**Nirali Prakashan** : New Mahadvar Road, Kedar Plaza, 1st Floor Opp. IDBI Bank, Kolhapur 416 012
Maharashtra. Mob : 9850046155; Email : niralikolhapur@pragationline.com**NAGPUR****Nirali Prakashan** : Above Maratha Mandir, Shop No. 3, First Floor,
Rani Jhanshi Square, Sitabuldi, Nagpur 440012, Maharashtra

Tel : (0712) 254 7129; Email : niralinagpur@pragationline.com

DELHI**Nirali Prakashan** : 4593/15, Basement, Agarwal Lane, Ansari Road, Daryaganj
Near Times of India Building, New Delhi 110002 Mob : 08505972553

Email : niralidelhi@pragationline.com

BENGALURU**Nirali Prakashan** : Matri Ground Floor, Jaya Apartments, No. 99, 6th Cross, 6th Main,
Mallewaram, Bengaluru 560003, Karnataka, Mob : 9449043034

Email : niralibangalore@pragationline.com

Other Branches : Hyderabad, Chennai

Note : Every possible effort has been made to avoid errors or omissions in this book. In spite of this, errors may have crept in. Any type of error or mistake so noted and shall be brought to our notice, shall be taken care of in the next edition. It is notified that neither the publisher, nor the author or book seller shall be responsible for any damage or loss of action to any one of any kind, in any manner, therefrom. The reader must cross check all the facts and contents with original Government notification or publications.

niralipune@pragationline.com | www.pragationline.com

Also find us on : www.facebook.com/niralibooks

A Manual for F.Y.B.Sc./F.Y.B.A. and F.Y.B.Sc.
(Computer Science)

COMPUTATIONAL MATHEMATICS USING MAXIMA SOFTWARE

Dr. Kalyanrao Takale

M.Sc., B.Ed., Ph.D.
RNC Arts, JDB Commerce and NSC Science College
Nashik Road, Nashik

Dr. Amjad Shaikh

M.Sc., Ph.D.
AKI's, Poona College of Arts, Science and Commerce
Pune

Dr. Vikas Jadhav

M.Sc., Ph.D.
Nowrosjee Wadia College
Pune

Dr. Shrikisan Gaikwad

M.Sc., B.Ed., M.Phil., Ph.D.
New Arts, Commerce and Science College
Ahmednagar

Dr. Veena P. Kshirsagar

M.Sc., M.Phil., Ph.D.
MIT World Peace University
Kothrud, Pune

Prof. S. R. Patil

M.Sc.
Ex. HOD., S.M. Joshi College
Hadapsar, Pune

Price ₹ 110.00


Parag P. Ghamandi
Nirali Prakashan
9850490869
niraliprakashan.parag@gmail.com
paragivmandi@gmail.com

 **GOLDEN
SERIES
by, NIRALI**

N5043

First Edition

December 2019

C

Authors

The text of this book has been prepared using the Maxima software system. The authors are not responsible for any errors or omissions in the text. The publisher and the author(s) disclaim any liability for any damage or loss of any kind or for any loss or damage caused to any person in any manner whatsoever. It is notified that neither the publisher nor the author(s) shall be held liable for any damage or loss of any kind or for any loss or damage caused to any person in any manner whatsoever.

Polyplate

Published By :

NIRALI PRAKASHAN

Address: E. K. Road, 2312 Shivajinagar

City: Mumbai - 400030

Tel: (022) 25511379 Fax: (022) 25511379

Email: nirali@pragationline.com

Printed By
YOGIRAJ PRINTERS AND BINDERS

Survey No. 10/1A, Ghule Industrial Estate

Nanded, Maharashtra

Registered: Pune - 411002

Mobile No. 9404233041, 9850046512

> **DISTRIBUTION CENTRES**

PUNE

Nirali Prakashan : 119, Budhwar Peth, Jogeshwan Mandir Lane, Pune-411002, Maharashtra

(For orders within Pune) Tel: (022) 2445 2044 Mobile: 9657703145

Email: niralocal@pragationline.com

Nirali Prakashan : S. No. 25/27, Dhavali, Near Asian College Pune-411041

(For orders outside Pune) Tel: (022) 24690204 Mobile: 9657703143

Email: bookorder@pragationline.com

MUMBAI

Nirali Prakashan : 355 S.V.P. Road, Rasdhara Co-op Hsg. Society Ltd.

Girgaum, Mumbai-400004 Maharashtra, Mobile: 9320129587

Tel: (022) 2385 6339 / 2386 9976 Fax: (022) 2386 9976

Email: niralmumbai@pragationline.com

> **DISTRIBUTION BRANCHES**

JALGAON

Nirali Prakashan : 34 V.V. Golani Market, Navi Peth, Jalgaon-425001, Maharashtra

Tel: (0257) 222 0395, Mob: 94234 91860, Email: niraljalgaon@pragationline.com

KOLHAPUR

Nirali Prakashan : New Mahadwar Road, Kedar Plaza, 1st Floor Opp. IDBI Bank, Kolhapur-416 012

Maharashtra, Mob: 9850046155, Email: niralkolhapur@pragationline.com

NAGPUR

Nirali Prakashan : Above Maratha Mandir, Shop No. 3, First Floor,

Kan. Jhansy Square, Sitabuldi, Nagpur-440012, Maharashtra

Tel: (0712) 254 7129, Email: niralinagpur@pragationline.com

DELHI

Nirali Prakashan : 4553/25, Basement, Agarwal Lane, Ansan Road, Daryagary

Near Times of India Building, New Delhi-110002, Mob: 08505972553

Email: niralidelhi@pragationline.com

BENGALURU

Nirali Prakashan : Math Ground Floor, Jaya Apartments, No. 99, 6th Cross, 6th Main,

Malleswaram, Bengaluru-560003, Karnataka, Mob: 9449043034

Email: niralibangalore@pragationline.com

Other Branches: Gujarat, Kolkata, Hyderabad, Chennai

Note: Every possible effort has been made to avoid errors or omissions in this book. In spite of this, errors may have crept in. Any type of error or mistake, if found, and shall be brought to our notice, shall be taken care of in the next edition. It is notified that neither the publisher nor the author or book seller shall be responsible for any damage or loss of order in any form or in any manner. Furthermore, the reader must cross check all the facts and contents with original Government notification or publications.

niralipune@pragationline.com | www.pragationline.com

Also find us on | www.facebook.com/niralibooks/

A Text Book for F.Y.B.Sc. (Computer Science)
Mathematics (2019 Pattern)
As Per Choice Based Credit System (CBCS)

PAPER - I : MTC-111 (Credit 2)

MATRIX ALGEBRA

Dr. K. C. Takale

RNC Arts, JDB Commerce and NSC Science College
Nashik Road, Nashik

Dr. S. B. Gaikwad

New Arts, Commerce and Science College
Ahmednagar

Dr. Mrs. N. H. Mahajan

Modern College of Arts, Science and Commerce
Shivajinagar, Pune

Dr. A. S. Shaikh

AKI's, Poona College of Arts, Science and Commerce
Pune

Prof. Mrs. S. R. Deshmukh

Modern College of Arts, Science and Commerce
Ganeshkhind, Pune

Prof. S. R. Patil

Ex. HOD., S. M. Joshi College
Hadapsar, Pune

Price ₹ 135.00

 **GOLDEN
SERIES**
by, **NIRALI**

N5054



MATRIX ALGEBRA

First Edition : July 2019
 Authors :

The text of this publication, or any part thereof, should not be reproduced or transmitted in any form or stored in any computer storage system or device for distribution except by photocopy, recording, taping or information retrieval system or reproduced on any disc, tape, perforated media or other information storage device etc. without the written permission of Author with whom the rights are reserved. Breach of this condition is liable for legal action.

Every effort has been made to avoid errors or omissions in this publication. In spite of this, errors may have crept in. Any mistake, error or discrepancy so noted and shall be brought to our notice shall be taken care of in the next edition. It is notified that neither the publisher nor the authors or seller shall be responsible for any damage or loss of action to any one of any kind in any manner, therefrom.

Polyplate

Printed By :
YOGIRAJ PRINTERS AND BINDERS
 Survey No. 10/1A, Ghule Industrial Estate
 Nanded Gaon Road
 Nanded, Pune - 411041
 Mobile No. 9404233041/9850046517

Published By :
NIRALI PRAKASHAN
 Abhyudaya Pragati 1312 Shivaji Nagar
 Ch. J.M. Road, PUNE - 411005
 Tel : (020) 25512336 / 25513739 Fax : (020) 25511379
 Email : niralipune@pragationline.com

> DISTRIBUTION CENTRES**PUNE**

Nirali Prakashan : 119, Fudhwar Peth, Jogeshwari Mandir Lane, Pune 411002, Maharashtra
 (For orders within Pune) Tel : (020) 2445 2044 Fax : (020) 2445 1538; Mobile : 9657703145
 Email : niralilocal@pragationline.com

Nirali Prakashan : S No 28/27 Dhayan, Near Asian College Pune 411041
 (For orders outside Pune) Tel : (020) 24690204 Fax : (020) 24690316; Mobile : 9657703143
 Email : bookorder@pragationline.com

MUMBAI

Nirali Prakashan : 385, SVP Road Rasdhara Co-op Hsg Society Ltd,
 Girgaum, Mumbai 400004, Maharashtra; Mobile : 9320129587
 Tel : (022) 2385 6339 / 2386 9976; Fax : (022) 2386 9976
 Email : niralimumbai@pragationline.com

> DISTRIBUTION BRANCHES**JALGAON**

Nirali Prakashan : 34 V V Golani Market, Navi Peth, Jalgaon 425001, Maharashtra,
 Tel : (0257) 222 0395 Mob : 94234 91860; Email : niralijalgaon@pragationline.com

KOLHAPUR

Nirali Prakashan : New Mahadwar Road, Kedar Plaza, 1st Floor Opp. IOBI Bank, Kolhapur 416 012
 Maharashtra Mob : 9850046155; Email : niralikolhapur@pragationline.com

NAGPUR

Nirali Prakashan : Above Maratha Mandir, Shop No 3, First Floor,
 Rani Jhanshi Square, Sitabuldi, Nagpur 440012, Maharashtra
 Tel : (0712) 254 7129; Email : niralinagpur@pragationline.com

DELHI

Nirali Prakashan : 4593/15, Basement, Agarwal Lane, Ansari Road, Daryaganj
 Near Times of India Building, New Delhi 110002 Mob : 08505972553
 Email : niralidelhi@pragationline.com

BENGALURU

Nirali Prakashan : Main Ground Floor, Jaya Apartments, No 99, 6th Cross, 6th Main,
 Malleswaram, Bengaluru 560003, Karnataka, Mob : 9449043034
 Email : niralibangalore@pragationline.com

Other Branches : Hyderabad, Chennai

Note : Every possible effort has been made to avoid errors or omissions in this book. In spite of this, errors may have crept in. Any type of error or mistake so noted, and shall be brought to our notice, shall be taken care of in the next edition. It is notified that neither the publisher, nor the author or book seller shall be responsible for any damage or loss of action to any one of any kind, in any manner, therefrom. The reader must cross check all the facts and contents with original Government notification or publications.

niralipune@pragationline.com | www.pragationline.com

Also find us on : f. www.facebook.com/nirallibooks

A Text Book for F.Y.B.Sc. (Computer Science)
Mathematics (2019 Pattern)
As Per Choice Based Credit System (CBCS)

PAPER - II : MTC-112 (Credit 2)

DISCRETE MATHEMATICS

Dr. K. C. Takale

RNC Arts, JDB Commerce and NSC Science College
Nashik Road, Nashik

Dr. S. B. Gaikwad

New Arts, Commerce and Science College
Ahmednagar

Dr. Mrs. N. H. Mahajan

Modern College of Arts, Science and Commerce
Shivajinagar, Pune

Dr. A. S. Shaikh

AKI's, Poona College of Arts, Science and Commerce
Pune

Prof. Mrs. S. R. Deshmukh

Modern College of Arts, Science and Commerce
Ganeshkhind, Pune

Prof. S. R. Patil

Ex. HOD, S. M. Joshi College
Hadapsar, Pune

Price ₹ 135.00

 **GOLDEN
SERIES**
by, **NIRALI**

N5055



DISCRETE MATHEMATICS**ISBN 978-93-89108-65-1**First Edition : July 2019
C Authors

The text, illustrations and any other material should not be reproduced or transmitted in any form or stored in any computer storage system or device for distribution, including photocopying, recording, language information retrieval system or reproduced on any disc, tape, perforated media or other information storage device etc. without the written permission of Authors with whom the rights are reserved. Breach of this condition is liable for legal action.

Errors and omissions may be made in any or some parts of this publication. In case of this errors may have crept in. Any mistake, error or discrepancy noted by the reader should be brought to the attention of the publisher in the next edition. It is notified that neither the publisher nor the authors or seller shall be responsible for any damage or loss of action to any one of any kind in any manner, therefrom.

Published By :
NIRALI PRAKASHAN
Aruna, Pimpri - 411007, Shivajinagar
Off. M. S. Road - 411005
Tel : (020) 25511379 / 27 39 Fax : (020) 25511379
Email : nirali@pragationline.com

Polyplate

Printed By :
YOGIRAJ PRINTERS AND BINDERS
Survey No. 10/1A, Ghule Industrial Estate
Nanded Gaon Road
Nanded, Pune - 411041
Mobile No. 9404233041/9850046517

> DISTRIBUTION CENTRES**PUNE**

Nirali Prakashan : 119, Budhwar Peth, Jogeshwari Mandir Lane, Pune 411002, Maharashtra
(For orders within Pune) Tel : (020) 2445 2044 Fax : (020) 2445 1538; Mobile : 9657703145
Email : niralilocal@pragationline.com

Nirali Prakashan : S. No. 25/27, Dhayari, Near Asian College Pune 411041
(For orders outside Pune) Tel : (020) 24690204 Fax : (020) 24690316; Mobile : 9657703143
Email : bookorder@pragationline.com

MUMBAI

Nirali Prakashan : 385 S.V.P. Road, Rasohara Co-op. Hsg. Society Ltd.,
Gurgaon, Mumbai 400004, Maharashtra, Mobile : 9320129587
Tel : (022) 2365 6339 / 2366 9976, Fax : (022) 2366 9976
Email : niralimumbai@pragationline.com

> DISTRIBUTION BRANCHES**JALGAON**

Nirali Prakashan : 34 V.V. Golani Market, Navi Peth, Jalgaon 425001, Maharashtra,
Tel : (0257) 222 0395, Mob : 94234 91860, Email : niralijalgaon@pragationline.com

KOLHAPUR

Nirali Prakashan : New Mahadwar Road, Kedar Plaza, 1st Floor Opp. IDBI Bank, Kolhapur 416 012
Maharashtra Mob : 9850046155; Email : niralikolhapur@pragationline.com

NAGPUR

Nirali Prakashan : Above Maratha Mandir, Shop No. 3, First Floor,
Rani Jhanshi Square, Sitabuldi, Nagpur 440012, Maharashtra
Tel : (0712) 254 7129, Email : niralinagpur@pragationline.com

DELHI

Nirali Prakashan : 4593/15 Basement, Agarwal Lane, Ansari Road, Daryaganj
Near Times of India Building New Delhi 110002 Mob : 08505972553
Email : niralidelhi@pragationline.com

BENGALURU

Nirali Prakashan : Mantri Ground Floor, Jaya Apartments, No 99, 6th Cross, 6th Main,
Malleswaram, Bengaluru 560003 Karnataka Mob : 9449043034
Email : niralibangalore@pragationline.com

Other Branches : Hyderabad, Chennai

Note : Every possible effort has been made to avoid errors or omissions in this book. In spite this, errors may have crept in. Any type of error or mistake so noted and shall be brought to our notice shall be taken care of in the next edition. It is notified that neither the publisher nor the author or book seller shall be responsible for any damage or loss of action to any one of any kind in any manner, therefrom. The reader must cross check all the facts and contents with original Government notification or publications.

niralipune@pragationline.com | www.pragationline.com

Also find us on www.facebook.com/niralibooks



A Text Book for F.Y.B.Sc. (Computer Science)
Semester - II
Mathematics Paper - I: MTC-121 (Credit 2)
Choice Based Credit System (CBCS)(2019 Pattern)

LINEAR ALGEBRA

Dr. Kalyanrao Takale

M.Sc, B.Ed, Ph.D.
RNC Arts, JDB Commerce and NSC Science College
Nashik Road, Nashik

Dr. Shrikisan Gaikwad

M.Sc, B.Ed, M.Phil, Ph.D.
New Arts, Commerce and Science College
Ahmednagar

Dr. Mrs. Nivedita Mahajan

M.Sc, M.Phil, Ph.D.
Modern College of Arts, Science and Commerce
Shivajinagar, Pune

Dr. Amjad Shaikh

M.Sc, Ph.D.
AKT's, Poona College of Arts, Science and Commerce
Pune

Prof. Mrs. Shamal Deshmukh

M.Sc, M.Phil.
Modern College of Arts, Science and Commerce
Ganeshkhind, Pune

Prof. S. R. Patil

M.Sc.
Ex. HOD, S.M. Joshi College
Hadapsar, Pune

Price ₹ 120.00

 **GOLDEN
SERIES**
by **NIRALI**

N5064



First Edition : December 2019
 © : Authors

The text of this publication or any part thereof, should not be reproduced or transmitted in any form or stored in any computer storage system or device for distribution including photocopy, recording, taping or information retrieval system or reproduced on any disc, tape, perforated media or other information storage device etc. without the written permission of Authors with whom the rights are reserved. Breach of this condition is liable for legal action.

Every effort has been made to avoid errors or omissions in this publication. In spite of this, errors may have crept in. Any mistake, error or discrepancy so noted and shall be brought to our notice shall be taken care of in the next edition. It is notified that neither the publisher nor the authors or seller shall be responsible for any damage or loss of action to any one of any kind, in any manner, therefrom.

Published By :
NIRALI PRAKASHAN
 Abhyudaya Pragati, 1312, Shivaji Nagar
 Off J.M. Road PUNE - 411005
 Tel - (020) 25512336/37/39, Fax - (020) 25511379
 Email: niralipune@pragationline.com

Polyplate

Printed By :
YOGIRAJ PRINTERS AND BINDERS
 Survey No. 10/1A, Ghule Industrial Estate
 Nanded Gaon Road
 Nanded, Pune - 411041
 Mobile No. 9404233041/9850046517

> **DISTRIBUTION CENTRES**

PUNE

Nirali Prakashan : 119, Budhwar Peth, Jogeshwari Mandir Lane, Pune 411002, Maharashtra
 (For orders within Pune) Tel: (020) 2445 2044, Mobile: 9657703145
 Email: niralilocal@pragationline.com

Nirali Prakashan : S. No. 28/27, Dhayari, Near Asian College Pune 411041
 (For orders outside Pune) Tel: (020) 24690204; Mobile: 9657703143
 Email: bookorder@pragationline.com

MUMBAI

Nirali Prakashan : 385, S.V.P. Road, Rasdhara Co-op. Hsg. Society Ltd.,
 Girgaum, Mumbai 400004, Maharashtra; Mobile: 9320129587
 Tel: (022) 2385 6339 / 2386 9976, Fax: (022) 2386 9976
 Email: niralimumbai@pragationline.com

> **DISTRIBUTION BRANCHES**

JALGAON

Nirali Prakashan : 34, V. V. Golani Market, Navi Peth, Jalgaon 425001, Maharashtra,
 Tel: (0257) 222 0395, Mob: 94234 91860; Email: niralijalgaon@pragationline.com

KOLHAPUR

Nirali Prakashan : New Mahadwar Road, Kedar Plaza, 1st Floor Opp. IDBI Bank, Kolhapur 416 012
 Maharashtra. Mob: 9850046155; Email: niralikolhapur@pragationline.com

NAGPUR

Nirali Prakashan : Above Maratha Mandir, Shop No. 3, First Floor,
 Rani Jhanshi Square, Sitabuldi, Nagpur 440012, Maharashtra
 Tel: (0712) 254 7129; Email: niralinagpur@pragationline.com

DELHI

Nirali Prakashan : 4593/15, Basement, Agarwal Lane, Ansari Road, Daryaganj
 Near Times of India Building, New Delhi 110002 Mob: 08505972553
 Email: niralidelhi@pragationline.com

BENGALURU

Nirali Prakashan : Maitri Ground Floor, Jaya Apartments, No. 99, 6th Cross, 6th Main,
 Malleswaram, Bengaluru 560003, Karnataka; Mob: 9449043034
 Email: niralibangalore@pragationline.com

Other Branches : Gujarat, Kolkata Hyderabad, Chennai

Note : Every possible effort has been made to avoid errors or omissions in this book. In spite of this, errors may have crept in. Any type of error or mistake so noted, and shall be brought to our notice, shall be taken care of in the next edition. It is notified that neither the publisher, nor the author or book seller shall be responsible for any damage or loss of action to any one of any kind, in any manner, therefrom. The reader must cross check all the facts and contents with original Government notification or publications.

niralipune@pragationline.com | www.pragationline.com

Also find us on f www.facebook.com/niralibooks

A Text Book for F.Y.B.Sc. (Computer Science)
Semester - II
MATHEMATICS PAPER - II : MTC-122 (Credit 2)
Choice Based Credit System (CBCS) (2019 Pattern)

GRAPH THEORY

Dr. Kalyanrao Takale

M.Sc., B.Ed., Ph.D.
RNC Arts, JDB Commerce and NSC Science College
Nashik Road, Nashik

Dr. Mrs. Nivedita Mahajan

M.Sc., B.Ed., Ph.D.
Modern College of Arts, Science and Commerce
Shivajinagar, Pune

Prof. Mrs. Shamal Deshmukh

M.Sc., M.Phil.
Modern College of Arts, Science and Commerce
Ganeshkhind, Pune

Dr. Shrikisan Gaikwad

M.Sc., B.Ed., M.Phil., Ph.D.
New Arts, Commerce and Science College
Ahmednagar

Dr. Amjad Shaikh

M.Sc., Ph.D.
AKI's, Poona College of Arts, Science and Commerce
Pune

Prof. S. R. Patil

M.Sc.
Ex. HOD., S.M. Joshi College
Hadapsar, Pune

Price ₹ 140.00


Parag P. Ghamandi
Nirali Prakashan
9850490869
niraliprakashan.parag@gmail.com
paragghamandi@gmail.com

 **GOLDEN
SERIES**
by, **NIRALI**

N5065



The text of this publication or any part thereof, should not be reproduced or transmitted in any form or stored in any computer storage system or decod- ing device, including photocopying, recording, taping or information retrieval system or reproduced on any disc, tape, perforated media or other information storage devices, without the written permission of Authors with whom the rights are reserved. Breach of this condition is liable for legal action.
 Every effort has been made to avoid errors or omissions in this publication. In spite of this, errors may have crept in. Any mistake, error or discrepancy noted should be brought to our notice shall be taken care of in the next edition. It is notified that neither the publisher nor the authors or sellers are responsible for any damage or loss of action to any one of any kind in any manner, therefrom.

Published By :
NIRALI PRAKASHAN
 Abundantya Pragati, 1812 Shivaji Nagar
 Chhatrapati Shivaji Maharaj, Pune - 411005
 Tel : (020) 25511336 / 277259 Fax : (020) 25511379
 Email : niralipune@pragationline.com

Polyplate

Printed at
YOGIRAJ PRINTERS AND BINDI
 Survey No. 10/1A, Ghule Industrial Estate
 Handed, Pune - 411
 Mobile No. 9404233041/98556246

> DISTRIBUTION CENTRES

- PUNE**
- Nirali Prakashan** : 119, Budhwar Peth, Jogeshwari Mandir Lane, Pune 411002, Maharashtra
 (For orders within Pune) Tel : (020) 2445 2044 Mobile : 9657703145
 Email : niralilocal@pragationline.com
 - Nirali Prakashan** : 5, No. 28/27, Dhayan, Near Asian College Pune 411041
 (For orders outside Pune) Tel : (020) 24690204, Mobile : 9657703143
 Email : bookorder@pragationline.com
- MUMBAI**
- Nirali Prakashan** : 385, S.V.P. Road, Rasdhara Co-op. Hsg. Society Ltd,
 Girgaum, Mumbai 400004, Maharashtra; Mobile : 9320129587
 Tel : (022) 2385 6339 / 2386 9976, Fax : (022) 2386 9976
 Email : niralimumbai@pragationline.com

> DISTRIBUTION BRANCHES

- JALGAON**
- Nirali Prakashan** : 34, V. V. Golani Market, Navi Peth, Jalgaon 425001, Maharashtra,
 Tel : (0257) 222 0395, Mob : 94234 91860, Email : niralijalgaon@pragationline.com
- KOLHAPUR**
- Nirali Prakashan** : New Mahadyar Road, Kedar Plaza, 1st Floor Opp. IDBI Bank, Kolhapur 416 012
 Maharashtra. Mob : 9850046155; Email : niralikolhapur@pragationline.com
- NAGPUR**
- Nirali Prakashan** : Above Maratha Mandir, Shop No. 3, First Floor,
 Pant Jhanshi Square, Sitabuldi, Nagpur 440012, Maharashtra
 Tel : (0712) 254 7129, Email : niralinagpur@pragationline.com
- DELHI**
- Nirali Prakashan** : 4593/15, Basement, Agarwal Lane, Ansan Road, Daryaganj
 Near Times of India Building, New Delhi - 110002 Mob : 08505972553
 Email : niralidelhi@pragationline.com
- BENGALURU**
- Nirali Prakashan** : Main Ground Floor, Jaya Apartments, No. 99, 6th Cross, 6th Main,
 Malleswaram, Bengaluru 560003, Karnataka, Mob : 9449043034
 Email : niralibangalore@pragationline.com
- Other Branches : Gujarat, Hyderabad, Chennai, Kolkata

Note : Every possible effort has been made to avoid errors or omissions in this book. In spite of this, errors may have crept in. Any type of error or mistake noted and shall be brought to our notice, shall be taken care of in the next edition. It is notified that neither the publisher, nor the author or book seller shall be responsible for any damage or loss of action to any one of any kind, in any manner, therefrom. The reader must cross check all the facts and contents with original Government notification of publications.

niralipune@pragationline.com | www.pragationline.com
 Also find us on : www.facebook.com/niralibooks